

The documentation and process conversion measures necessary to comply with this revision shall be completed by 22 September 2001.

INCH-POUND

MIL-PRF-19500/323G  
22 June 2001  
SUPERSEDING  
MIL-PRF-19500/323F  
15 April 1998

## PERFORMANCE SPECIFICATION

SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, SWITCHING  
TYPES 2N3250A, 2N3251A, 2N3250AUB, 2N3251AUB,  
JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

This specification is approved for use by all Departments  
and Agencies of the Department of Defense.

### 1. SCOPE

1.1 Scope. This specification covers the performance requirements for PNP silicon switching transistors. Four levels of product assurance are provided for each device type as specified in MIL-PRF-19500. Two levels of product assurance are provided for die.

1.2 Physical dimensions. See figures 1 (similar to TO-18), 2 (surface mount), and 3 (die) herein.

1.3 Maximum ratings.

$P_T$ (1) $T_A = +25^\circ\text{C}$	$V_{CBO}$	$V_{CEO}$	$V_{EBO}$	$I_C$	$T_{OP}$ and $T_{STG}$	$R_{\theta JA}$ (1)
<u>W</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>mA dc</u>	<u><math>^\circ\text{C}</math></u>	<u><math>^\circ\text{C/W}</math></u>
0.36	60	60	5.0	200	-65 to +200	417

(1) Derate linearly 2.4 mW/ $^\circ\text{C}$  above  $T_A = +25^\circ\text{C}$ .

1.4 Primary electrical characteristics.

Limits	$h_{FE1}$ $V_{CE} = 1.0 \text{ V dc}$ $I_C = 0.1 \text{ mA dc}$	$h_{FE3}$ (1) $V_{CE} = 1.0 \text{ V dc}$ $I_C = 10 \text{ mA dc}$	$h_{FE4}$ (1) $V_{CE} = 1.0 \text{ V dc}$ $I_C = 50 \text{ mA dc}$	$ h_{fe} $ $f = 100 \text{ MHz}$ $V_{CE} = 20 \text{ V dc}; I_C = 10 \text{ mA dc}$
	Min    Max	Min    Max	Min    Max	Min    Max
2N3250A	40	50    150	15	2.5    9.0
2N3251A	80	100    300	30	3.0    9.0

(1) Pulsed (see 4.5.1).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Supply Center, Columbus, ATTN: DSCC/VAC, Post Office Box 3990, Columbus, OH 43216-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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FSC 5961

1.4 Primary electrical characteristics - Continued.

Limits	$r_b'C_C$ $V_{CE} = 20 \text{ V dc}$ $I_C = 10 \text{ mA dc}$ $f = 31.8 \text{ MHz}$	$V_{CE(SAT)1}$ $I_C = 10 \text{ mA dc}$ $I_B = 1.0 \text{ mA dc}$	$C_{obo}$ $V_{CB} = 10 \text{ V dc}$ $I_E = 0$ $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$	$t_{on}$ $I_C = 10 \text{ mA dc}$ $I_B = 1.0 \text{ mA dc}$	$t_{off}$ $I_C = 10 \text{ mA dc}$ $I_B = 1.0 \text{ mA dc}$		$N_F$ $V_{CE} = 5 \text{ V dc}$ $I_C = .1 \text{ mA dc}$ $R_g = 1 \text{ k}\Omega$ $f = 100 \text{ Hz}$
					2N3250A	2N3251A	
	<u>ps</u>	<u>V dc</u>	<u>pF</u>	<u>ns</u>	<u>ns</u>	<u>ns</u>	<u>dB</u>
Min	5	0.25	6	70	250	300	6
Max	250						

## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

## SPECIFICATION

## DEPARTMENT OF DEFENSE

MIL-PRF-19500 - Semiconductor Devices, General Specification for.

## STANDARD

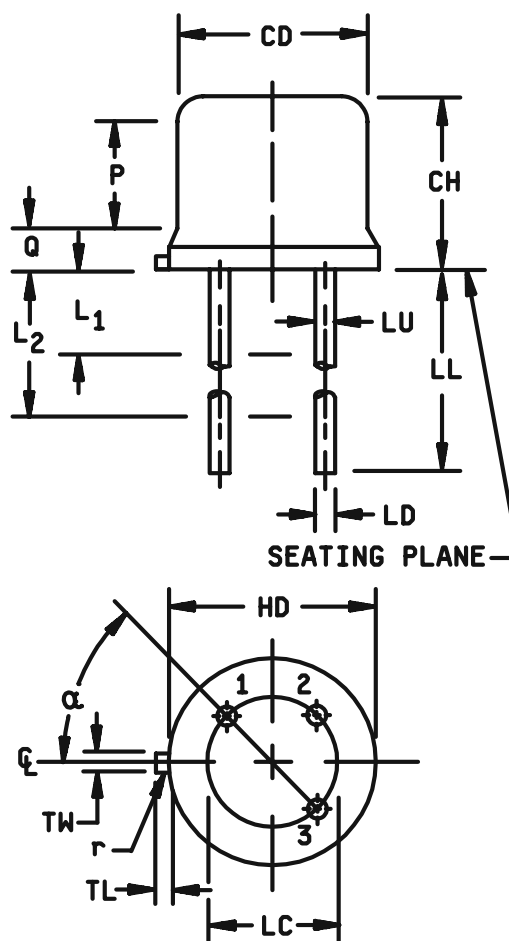
## DEPARTMENT OF DEFENSE

MIL-STD-750 - Test Methods for Semiconductor Devices.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Document Automation and Production Services (DAPS), Building 4D (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

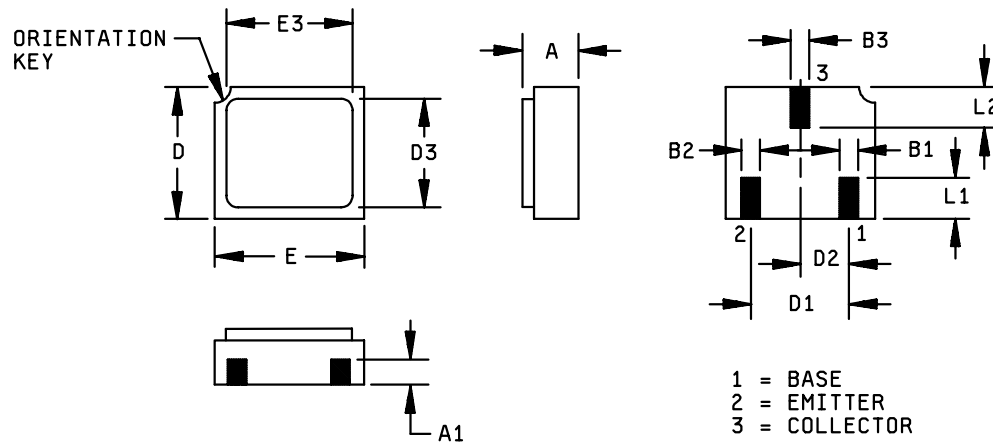
Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.178	.195	4.52	4.95	
CH	.170	.210	4.32	5.34	
HD	.209	.230	5.31	5.84	
LC	.100 TP		2.54 TP		6
LD	.016	.021	0.41	0.53	7, 8
LL	.500	.750	12.70	19.05	7, 8, 12
LU	.016	.019	0.41	0.48	7, 8
L <sub>1</sub>		.050		1.27	7, 8
L <sub>2</sub>	.250		6.35		7, 8
Q		.040		1.02	5
r		.007		0.178	10
TL	.028	.048	0.71	1.22	3, 4
TW	.036	.046	0.91	1.17	3
α	45° TP		45° TP		6



## NOTES:

1. Dimension are in inches.
2. Metric equivalents are given for general information only.
3. Beyond r (radius) maximum, TW shall be held for a minimum length of .011 (0.28 mm).
4. Dimension TL measured from maximum HD.
5. Body contour optional within zone defined by HD, CD, and Q.
6. Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC. The device may be measured by direct methods.
7. Dimension LU applies between L<sub>1</sub> and L<sub>2</sub>. Dimension LD applies between L<sub>2</sub> and LL minimum. Diameter is uncontrolled in L<sub>1</sub> and beyond LL minimum.
8. All three leads.
9. The collector shall be internally connected to the case.
10. Dimension r (radius) applies to both inside corners of tab.
11. In accordance with ANSI Y14.5M, diameters are equivalent to  $\phi$ x symbology.

FIGURE 1. Physical dimensions (similar to TO-18 ).

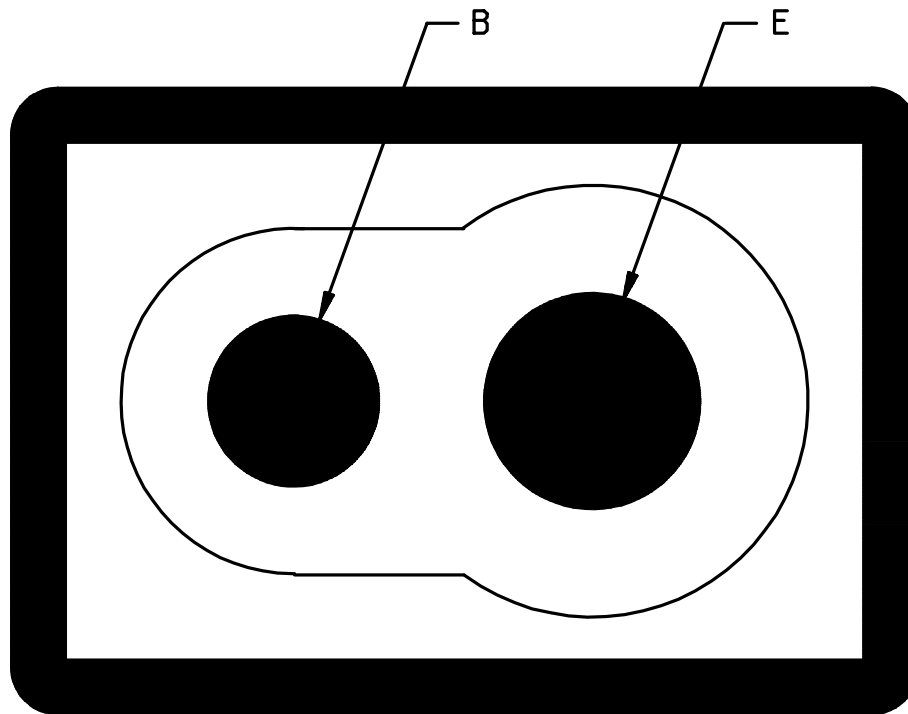


Symbol	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
A	.046	.056	0.97	1.42	
A1	.017	.035	0.43	0.89	
B1	.016	.024	0.41	0.61	
B2	.016	.024	0.41	0.61	
B3	.016	.024	0.41	0.61	
D	.085	.108	2.41	2.74	
D1	.071	.079	1.81	2.01	
D2	.035	.039	0.89	0.99	
D3	.085	.108	2.41	2.74	
E	.115	.128	2.82	3.25	
E3		.128		3.25	
L1	.022	.038	0.56	0.96	
L2	.022	.038	0.56	0.96	

## NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 2. Physical dimensions, surface mount (UB version).



NOTES:

1. Chip size ..... 15 x 19 mils  $\pm$  1 mil
2. Chip thickness..... 10  $\pm$  1.5 mil
3. Top metal ..... Aluminum 15,000Å minimum, 18,000Å nominal
4. Back metal ..... A. Gold 2,500Å minimum, 3,000Å nominal  
B. Eutectic Mount – No Gold
5. Backside..... Collector
6. Bonding pad ..... B = 3 mils, E = 4 mils diameter
7. Passivation..... Si<sub>3</sub>N<sub>4</sub> (Silicon Nitride) 2 kÅ min, 2.2 kÅ nom.

FIGURE 3. Physical dimensions, JANHCA and JANKCA die.

### 3. REQUIREMENTS

3.1 General. The requirements for acquiring the product described herein shall consist of this document and MIL-PRF-19500.

3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturer's list (QML) before contract award (see 4.2 and 6.3).

3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500 and as follows.

$I_{BEX}$  - - - Base cutoff current (dc) with specified circuit between the collector and emitter.

3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500, and on figure 1 (TO-18), figure 2 (UB surface mount), and figure 3 (die) herein.

3.4.1 Lead finish. Lead finish shall be solderable in accordance with MIL-PRF-19500, MIL-STD-750, and herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

3.5 Marking. Marking shall be in accordance with MIL-PRF-19500.

3.6 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3, 1.4, and table I herein.

3.7 Electrical test requirements. The electrical test requirements shall be the subgroups specified in 4.4.2 and 4.4.3 herein.

3.8 Workmanship. Semiconductor devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

### 4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Screening (see 4.3).
- c. Conformance inspection (see 4.4).

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500 and as specified herein.

4.3 Screening (JANS, JANTX and JANTXV levels only). Screening shall be in accordance with table IV of MIL-PRF-19500, and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen (see table IV of MIL-PRF-19500)	Measurement	
	JANS level	JANTX and JANTXV levels
9	$h_{FE3}$ , $I_{CBO2}$	Not applicable
11	$I_{CBO2}$ ; $h_{FE3}$ ; $\Delta I_{CBO2}$ = 100 percent of initial value or 5 nA dc, whichever is greater, $\Delta h_{FE3}$ = 25 percent change from initial value	$I_{CBO2}$ and $h_{FE3}$
12	See 4.3.1	See 4.3.1
13	Subgroups 2 and 3 of table I herein; $\Delta I_{CBO2}$ = 100 percent of initial value or 5 nA dc, whichever is greater; $\Delta h_{FE3}$ = 25 percent change from initial value.	Subgroup 2 of table I herein; $\Delta I_{CBO2}$ = 100 percent of initial value or 5 nA dc, whichever is greater; $\Delta h_{FE3}$ = 25 percent change from initial value.

4.3.1 Power burn-in conditions. Power burn-in conditions are as follows:  $T_A$  = Room ambient as defined in 4.5 of MIL-STD-750;  $V_{CB}$  = 10- 30 V dc (10 V dc for JANS);  $P_T$  = 360 mW. NOTE: No heat sink or forced air cooling on the devices shall be permitted.

4.3.2 Screening JANC. Screening shall be in accordance with MIL-PRF-19500. As a minimum, die shall be 100 percent probed to ensure compliance with group A, subgroup 2.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500 and as specified herein.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with table V of MIL-PRF-19500 and table I herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VIa (JANS) and table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with group A, subgroup 2 herein. Delta requirements shall be in accordance with the steps of table III herein as specified in the notes for table III.

4.4.2.1 Group B inspection, table VIa (JANS) of MIL-PRF-19500.

<u>Subgroup</u>	<u>Method</u>	<u>Conditions</u>
B4	1037	$V_{CB} = 10 \text{ V dc.}$
B5	1027	$V_{CB} = 10 - 30 \text{ V dc; } T_A = +125^\circ\text{C} \pm 25^\circ\text{C}$ for 96 hours with $P_T$ adjusted according to the chosen $T_A$ to give $T_J = +275^\circ\text{C}$ minimum. Optionally, the test may be conducted for minimum 216 hrs with $P_T$ adjusted to achieve $T_J = +225^\circ\text{C}$ minimum, sample size (for option) = 45, $c = 0$ . In this case, the ambient temperature shall be adjusted such that a minimum 75 percent of maximum rated $P_T$ (see 1.3) is applied to the device under test. (NOTE: If a failure occurs, resubmission shall be at the test conditions of the original sample.)
B6	3131	See 4.5.3 herein.

4.4.2.2 Group B inspection, table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500.

<u>Subgroup</u>	<u>Method</u>	<u>Conditions</u>
B3	1027	$V_{CB} = 10 - 30 \text{ V dc; } T_A = \text{room ambient}$ as defined in the general requirements of MIL-STD-750. Power shall be applied to achieve $T_J = +150^\circ\text{C}$ minimum and a minimum power dissipation $P_D \geq 75$ percent of maximum rated $P_T$ as defined in 1.3.
B5	3131	See 4.5.3.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VII of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with group A, subgroup 2 herein. Delta requirements shall be in accordance with the steps of table III herein as specified in the notes for table III.

4.4.3.1 Group C inspection, table VII of MIL-PRF-19500.

<u>Subgroup</u>	<u>Method</u>	<u>Conditions</u>
C2	2036	Test condition E, not applicable to surface mount.
C6	1027	$V_{CB} = 10 - 30 \text{ V dc; } T_A = \text{room ambient}$ as defined in the general requirements of MIL-STD-750. Power shall be applied to achieve $T_J = +150^\circ\text{C}$ minimum and a minimum power dissipation $P_D \geq 75$ percent of maximum rated $P_T$ as defined in 1.3.



4.4.4 Group E Inspection. Group E inspection shall be performed for qualification or re-qualification only. The tests specified in table II herein must be performed to maintain qualification.

4.5 Method of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of MIL-STD-750.

4.5.2 Collector - base time constant. This parameter may be determined by applying an rf signal voltage of 1.0 volt (rms) across the collector-base terminals, and measuring the ac voltage drop ( $V_{eb}$ ) with a high impedance rf voltmeter across the emitter-base terminals. With  $f = 31.8$  MHz used for the 1.0 V signal, the following computation applies;  $r_b'C_c$  (ps) =  $5 \times V_{eb}$  (millivolts), see figure 4.

4.5.3 Thermal resistance. Thermal resistance measurements shall be conducted in accordance with test method 3131 of MIL-STD-750. The following details shall apply:

- a. Minimum collector magnitude shall be 36 mA dc.
- b. Collector to emitter voltage magnitude shall be 10 V dc.
- c. Reference point temperature shall be  $+25^{\circ}\text{C} \leq T_R \leq +35^{\circ}\text{C}$ . The chosen reference temperature shall be recorded before the test is started.
- d. Maximum  $R_{\theta JA}$  limit shall be  $417^{\circ}\text{C/W}$ .

TABLE I. Group A inspection.

Inspection 1/  <u>Subgroup 1</u>	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
Visual and mechanical examination	2071					
<u>Subgroup 2</u>						
Collector to base cutoff current	3036	Bias condition D; $V_{CB} = 60$ V dc	$I_{CBO1}$		10	$\mu$ A dc
Emitter to base cutoff current	3026	Bias condition D; $V_{EB} = 5$ V dc	$I_{EBO}$		10	$\mu$ A dc
Breakdown voltage collector - emitter	3011	Bias condition D; $I_C = 10$ mA dc; pulsed (see 4.5.1)	$V_{(BR)CEO}$	60		V dc
Collector - base cutoff current	3036	Bias condition D; $V_{CB} = 40$ V dc	$I_{CBO2}$		20	nA dc
Collector - emitter cutoff current	3041	Bias condition A; $V_{BE} = 3.0$ V dc, $V_{CE} = 40$ V dc	$I_{CEX1}$		20	nA dc
Base cutoff current	3041	Bias condition A; $V_{BE} = 3.0$ V dc; $V_{CE} = 40$ V dc	$I_{BEX}$		50	nA dc
Forward-current transfer ratio 2N3250A, 2N3250AUB 2N3251A, 2N3251AUB	3076	$V_{CE} = 1.0$ V dc; $I_C = 0.1$ mA dc	$h_{FE1}$	40 80		
Forward-current transfer ratio 2N3250A, 2N3250AUB 2N3251A, 2N3251AUB	3076	$V_{CE} = 1.0$ V dc; $I_C = 1.0$ mA dc	$h_{FE2}$	45 90		
Forward-current transfer ratio  2N3250A, 2N3250AUB 2N3251A, 2N3251AUB	3076	$V_{CE} = 1.0$ V dc; $I_C = 10$ mA dc, pulsed (see 4.5.1)	$h_{FE3}$	50 100	150 300	
Forward-current transfer ratio  2N3250A, 2N3250AUB 2N3251A, 2N3251AUB	3076	$V_{CE} = 1.0$ V dc; $I_C = 10$ mA dc, pulsed (see 4.5.1)	$h_{FE4}$	15 30		

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 2</u> - Continued						
Current gain linearity		$\frac{ h_{FE3} - h_{FE1} }{h_{FE3}} \times 100$	$h_{FE}$			
2N3250A, 2N3250AUB 2N3251A, 2N3251AUB					40 30	% %
Collector - emitter saturated voltage	3071	$I_C = 10 \text{ mA dc}; I_B = 1.0 \text{ mA dc}$	$V_{CE(SAT)1}$		0.25	V dc
Collector - emitter saturated voltage	3071	$I_C = 50 \text{ mA dc}; I_B = 5.0 \text{ mA dc};$ pulsed (see 4.5.1)	$V_{CE(SAT)2}$		0.50	V dc
Base - emitter saturated voltage	3066	Test condition A; $I_C = 10 \text{ mA dc}; I_B = 1.0 \text{ mA dc}$	$V_{BE(SAT)1}$	0.60	0.90	V dc
Base - emitter saturated voltage	3066	Test condition A; $I_C = 50 \text{ mA dc}; I_B = 5.0 \text{ mA dc};$ pulsed (see 4.5.1)	$V_{BE(SAT)2}$		1.20	V dc
<u>Subgroup 3</u>						
High-temperature operation:		$T_A = +150^{\circ}\text{C}$				
Collector - emitter cutoff current	3041	Bias condition A; $V_{CE} = 40 \text{ V dc}; V_{BE} = 3.0 \text{ V dc}$	$I_{CEX2}$		20	$\mu\text{A dc}$
Low-temperature operation:		$T_A = -55^{\circ}\text{C}$				
Forward-current transfer ratio	3076	$V_{CE} = 1.0 \text{ V dc}; I_C = 1.0 \text{ mA dc}$	$h_{FE5}$			
2N3250A, 2N3250AUB 2N3251A, 2N3251AUB				20 40		
<u>Subgroup 4</u>						
Small-signal short-circuit forward-current transfer ratio	3206	$V_{CE} = 10 \text{ V dc}; I_C = 1 \text{ mA dc};$ $f = 1 \text{ kHz}$	$h_{fe}$			
2N3250A, 2N3250AUB 2N3251A, 2N3251AUB				50 100	200 400	

See footnote at end of table.

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TABLE I. Group A inspection - Continued.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 4</u> - Continued						
Magnitude of common emitter small-signal short-circuit forward-current transfer ratio  2N3250A, 2N3250AUB 2N3251A, 2N3251AUB	3306	V <sub>CE</sub> = 20 V dc; I <sub>C</sub> = 10 mA dc; f = 100 MHz	h <sub>fe</sub>	2.5 3.0	9.0 9.0	
Open circuit output capacitance	3236	V <sub>CB</sub> = 10 V dc; I <sub>E</sub> = 0 100 kHz ≤ f ≤ 1 MHz	C <sub>obo</sub>		6	pF
Input capacitance (output open-circuited)	3240	V <sub>EB</sub> = 1.0 V dc; I <sub>C</sub> = 0; 100 kHz ≤ f ≤ 1 MHz	C <sub>ibo</sub>		8	pF
Collector - base time constant		V <sub>CE</sub> = 20 V dc; I <sub>C</sub> = 10 mA dc; f = 31.8 MHz; (see 4.5.2 and figure 4)	r <sub>b</sub> 'C <sub>c</sub>	5	250	ps
Noise figure	3246	V <sub>CE</sub> = 5.0 V dc; I <sub>C</sub> = 100 μA dc; R <sub>g</sub> = 1 kΩ; f = 100 Hz	NF		6	dB
Pulse response:						
On-time	3251	Test condition A; I <sub>C</sub> = 10 mA dc; I <sub>B1</sub> = 1.0 mA dc; (see figure 5)	t <sub>on</sub>		70	ns
Off time	3251	Test condition A; I <sub>C</sub> = 10 mA dc; I <sub>B1</sub> = I <sub>B2</sub> = 1.0 mA dc (see figure 6)	t <sub>off</sub>		250 300	ns ns
2N3250A, 2N3250AUB 2N3251A, 2N3251AUB						
Small-signal open circuit reverse-voltage transfer ratio 2N3250A, 2N3250AUB 2N3251A, 2N3251AUB	3211	V <sub>CE</sub> = 10 V dc; I <sub>C</sub> = 1.0 mA dc; f = 1 kHz	h <sub>re</sub>		10 20	x 10 <sup>-4</sup> x 10 <sup>-4</sup>
Small-signal short circuit input impedance 2N3250A, 2N3250AUB 2N3251A, 2N3251AUB	3201	V <sub>CE</sub> = 10 V dc; I <sub>C</sub> = 1.0 mA dc; f = 1 kHz	h <sub>ie</sub>	1 2	6 12	kΩ kΩ
Small-signal open circuit output admittance 2N3250A, 2N3250AUB 2N3251A, 2N3251AUB		V <sub>CE</sub> = 10 V dc; I <sub>C</sub> = 1.0 mA dc; f = 1 kHz	h <sub>oe</sub>	4 10	40 60	μmhos μmhos

1/ For sampling plan, see MIL-PRF-19500.

TABLE II. Group E inspection (all quality levels) - For qualification only

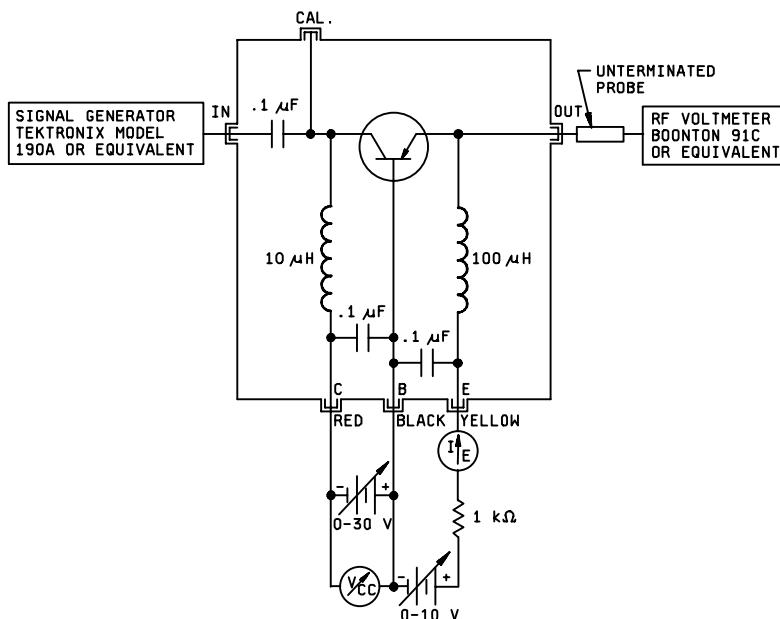
Inspection	MIL-STD-750		Qualification
	Method	Conditions	
<u>Subgroup 1</u>			12 devices c = 0
Temperature cycling (air to air)	1051	Test condition C, 500 cycles	
Hermetic seal	1071		
Fine leak			
Gross leak			
Electrical measurements		See group A, subgroup 2 herein.	
<u>Subgroup 2</u>			45 devices c = 0
Intermittent life	1037	Intermittent operation life: $V_{CB} = 10 \text{ V dc}$ , 6,000 cycles, $\Delta T_J \geq +100^\circ\text{C}$ ; forced air cooling allowed on cooling cycle only.	
Electrical measurements		See group A, subgroup 2 herein.	
<u>Subgroup 3</u>			
Not applicable			
<u>Subgroup 4</u>			
Not applicable			
<u>Subgroup 5</u>			
Not applicable			

TABLE III. Group B and Group C delta measurements. 1/ 2/ 3/

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Forward-current transfer ratio	3076	$V_{CE} = 1.0 \text{ V dc}$ ; $I_C = 10 \text{ mA dc}$ ; pulsed (see 4.5.1)	$\Delta h_{FE3}$	$\pm 25$ percent change from initial value.		
2.	Collector - base cutoff current	3036	Bias condition D; $V_{CB} = 40 \text{ V dc}$	$\Delta I_{CBO2}$	100 percent of initial value or 5 nA dc, whichever is greater.		
3.	Collector - emitter voltage (saturated)	3071	$I_C = 50 \text{ mA dc}$ ; $I_B = 5.0 \text{ mA dc}$	$\Delta V_{CE(Sat)2}$	50 mV dc change from initial value.		

- 1/ The delta measurements for table VIa (JANS) of MIL-PRF-19500 are as follows:
- Subgroup 4, see table III herein, step 3.
  - Subgroup 5, see table III herein, steps 1, 2, and 3.
- 2/ The delta measurements for table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500 are as follows: Subgroups 3 and 6, see table III herein, step 1.
- 3/ The delta measurements for table VII of MIL-PRF-19500 are as follows: Subgroup 6, see table III herein, steps 1 and 2 (for JANS) and 1 (for JAN, JANTX, and JANTXV).

MIL-PRF-19500/323G



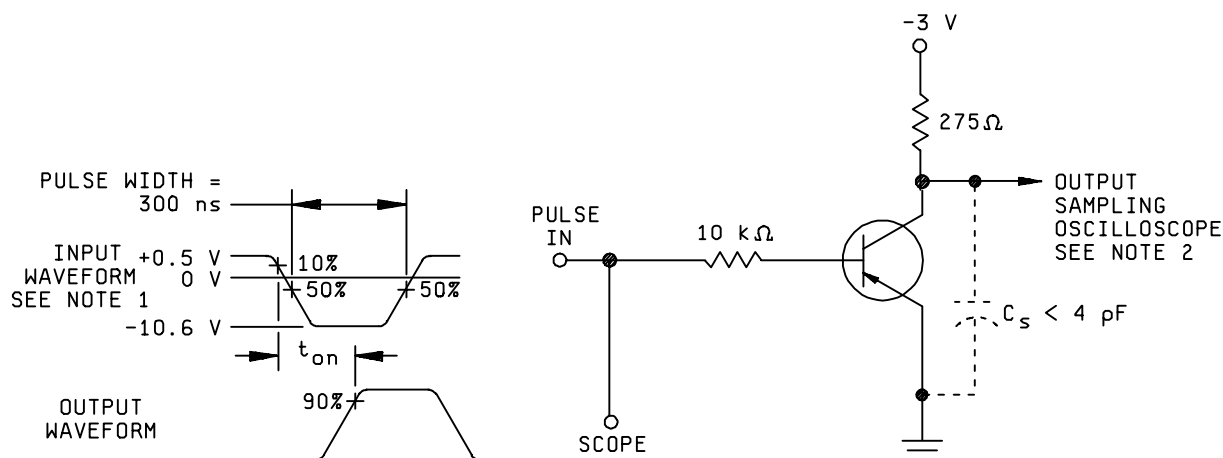
Procedure:

1. Set signal generator to 31.8 MHz and connect to "IN" connector on test jig.
2. Connect low voltage dc power supplies as shown. A 1 K ohm resistor should be placed in series with the emitter power supply to prevent damage to transistors being tested.
3. Set collector supply for  $V_{CE} = -20$  V dc, and emitter supply for  $I_C = -10$  mA.
4. Connect RF voltmeter with unterminated probe adapter to "CAL" connector on test jig. Adjust signal generator until RF voltage is 1 volt (NOTE: Decade switching of voltmeter should be accurate from 1 mV to 3 volts. If not, input voltage may be set using voltage dividers, utilizing lower scales of the RF voltmeter. If this is done, the voltage dividers should be left in place when the voltmeter is removed, as they constitute a load on the input of the circuit.
5. Remove RF voltmeter from "CAL" connector and connect to "OUT" connector. Meter will now read  $r_b'C_c$  as follows:

Meter range full scale

3 mV  
10 mV  
30 mV  
.1 volt

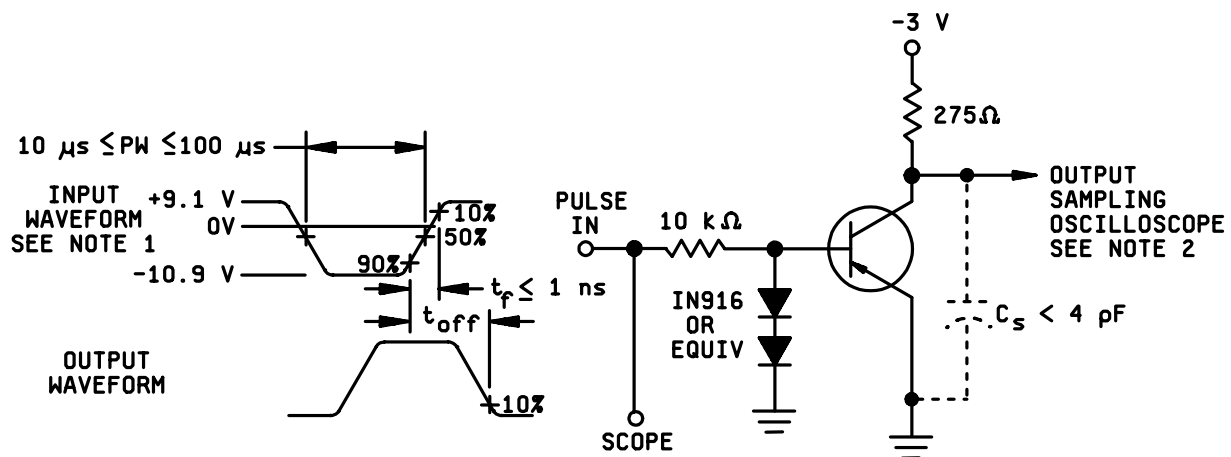
FIGURE 4. Collector-base time constant test circuit (an equivalent circuit may be used).



## NOTES:

1. The rise time ( $t_r$ ) of the applied pulse shall be  $\leq 1.0 \text{ ns}$ , duty cycle  $\leq 2$  percent, and the generator source Z shall be  $50 \Omega$ .
2. Sampling oscilloscope:  $Z_{IN} \geq 100 \text{ k}\Omega$ ; rise time( $t_r$ )  $\leq .1 \text{ ns}$ .

FIGURE 5. Delay and rise time, test circuit.



## NOTES:

1. The rise time ( $t_r$ ) of the applied pulse shall be  $\leq 1.0 \text{ ns}$ , duty cycle  $\leq 2$  percent, and the generator source Z shall be  $50 \Omega$ .
2. Sampling oscilloscope:  $Z_{IN} \geq 100 \text{ k}\Omega$ ; rise time ( $t_r$ )  $\leq .1 \text{ ns}$ .

FIGURE 6. Storage and fall time, test circuit.



## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The notes specified in MIL-PRF-19500 are applicable to this specification.

6.2 Acquisition requirements. The acquisition requirements are as specified in MIL-PRF-19500.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers' List (QML) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center, Columbus, ATTN: DSCC/VQE, P.O. Box 3990, Columbus, OH 43216-5000.

6.4 Suppliers of JANHC and JANKC die. The qualified JANHC/JANKC suppliers with the applicable letter version (example, JANHCA2N3250A) will be identified on the QML.

JANC ordering information	
PIN	Manufacturer
	12498
2N3250A 2N3251A	JANHCA2N3250A JANHCA2N3251A
2N3250A 2N3251A	JANKCA2N3250A JANKCA2N3251A

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:

Army - CR  
Navy - NW  
Air Force - 11  
NASA - NA  
DLA - CC

Preparing activity:

DLA - CC

(Project 5961-2307)

Review activities:

Army - AR, AV, MI, SM  
Navy - AS, MC  
Air Force - 19

**STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL****INSTRUCTIONS**

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
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**I RECOMMEND A CHANGE:**

1. DOCUMENT NUMBER  
MIL-PRF-19500/323G

2. DOCUMENT DATE  
22 June 2001

**3. DOCUMENT TITLE**

SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, SWITCHING TYPES 2N3250A, 2N3251A, 2N3250AUB, 2N3251AUB, JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

**5. REASON FOR RECOMMENDATION****6. SUBMITTER**

a. NAME (Last, First, Middle initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)  
COMMERCIAL  
DSN  
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7. DATE SUBMITTED

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